

Codename _____ Transitions, Test 1
(Do not put your name on the test; write your name and codename on the code sheet)

1) For the function f , below, show that no two input values give the same output value.

$$f: \mathbb{R} \rightarrow \mathbb{R}$$
$$x \mapsto 3x + 4$$

2) Let A and B be sets. Show that $A \cap B = A$ implies $A \subseteq B$.

Codename _____ Transitions, Sheet 2
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3) Show that:

$$\forall_{a \in \mathbb{Z}} \forall_{b \in \mathbb{Q}} \left((a + b\sqrt{5}) \cdot (a - b\sqrt{5}) \in \mathbb{Q} \right)$$

4) Translate this sentence into mathematical symbolism.

“There is a real number whose negation is larger than some complex number”

5) Translate this mathematical expression into a sentence.

$$\forall_{x \in \mathbb{C}} \exists_{y \in \mathbb{Z}_{>0}} (|x| < y)$$

6) Prove that:

$$\bigcup_{n=0}^{\infty} \{n, -n\} = \mathbb{Z}$$

Codename _____ Transitions, Sheet 4
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7) Let A, B and C be sets such that $A \neq \emptyset$. Assume that $A \times B = A \times C$. Prove that $B = C$.